Dibenzofuran

Chemical Information
CAS Number - 132-64-9
Alternate Names - diphenylene oxide
General Uses - This chemical is used as an insecticide and to make other chemicals. It is made from coal tar and has been found in coke dust, grate ash, fly ash and flame soot.
Potential Hazards - This chemical can cause skin, eye, nose and throat irritation.

Summary Analysis– Dibenzofuran

- In 2003, the 75,605 pounds of dibenzofuran accounted for about 0.1 percent of the total quantity of PCs. Since 1999, there was a 36.4 percent decrease in the quantity of dibenzofuran. The number of facilities that reported dibenzofuran from 1999 to 2003 has remained relatively constant, with 12 facilities reporting this chemical in 2003.
- There have been significant changes, from one year to the next, regarding the usage of management methods for dibenzofuran. Use of disposal, energy recovery, and treatment methods have varied considerably with no obvious trend. In 2003, over 87 percent of the dibenzofuran was land disposed.
- Of the 12 facilities that reported dibenzofuran in 2003, two facilities accounted for 84 percent of the total quantity of this chemical.
- Dibenzofuran was reported by facilities in only 3 Regions in 2003. In 2003, almost 78 percent of the dibenzofuran was reported by facilities in Regions 5.
- Although facilities in 10 states reported a PC quantity of dibenzofuran in 2003, facilities in 5 of these states accounted for over 99 percent of the total PC quantity of dibenzofuran. One facility, in Michigan, which only began reporting dibenzofuran in 2003, accounted for almost 69 percent of the total quantity of this chemical in 2003.
- Facilities in three industry sectors (SIC codes) accounted for over 99 percent of this chemical in 2003. Facilities in SIC 2865 (Cyclic crudes and intermediates) reported the highest quantities, accounting for almost 93 percent of the total quantity.

National Trends – Dibenzofuran. Exhibit 4.56 presents the total PC quantity (lbs.) of dibenzofuran in 1999 to 2003, showing the disposal, treatment, energy recovery, as well as recycling quantities. In 2003, the 75,605 pounds of dibenzofuran accounted for about 0.1 percent of the total quantity of PCs. Since 1999, there has been a 36.4 percent decrease in the quantity of dibenzofuran. The number of facilities that reported dibenzofuran from 1999 to 2003 has remained relatively constant, with 12 facilities reporting this chemical in 2003.

Since 1999, there have been significant yearly changes regarding the usage of management methods for dibenzofuran. Use of disposal, energy recovery, and treatment methods have varied considerably with no obvious trend. In 2003, over 87 percent of the dibenzofuran was land disposed. Recycling of dibenzofuran reached a peak in 2001 and has since declined.

Exhibit 4.56. National-Level Information for Dibenzofuran

	1999	2000	2001	2002	2003	Percent Change (1999 -2003)	Management Method -- Percent of Quantity of this Chemical in 2003
Number of Facilities	9	11	10	10	12	33.3%	
Disposal Quantity (lbs.)	16,877	11,200	39,885	17,464	66,104	291.7%	87.4%
Energy Recovery Quantity (lbs.)	96,910	23,827	22,574	266,221	1,340	-98.6%	1.8%
Treatment Quantity (lbs.)	5,039	57,775	4,261	5,228	8,161	62.0%	10.8%
Priority Chemical Quantity (lbs.)	118,826	92,802	66,720	288,912	75,605	-36.4%	
Recycling Quantity (lbs.)	41,053	99,627	144,668	132,524	24,754	-39.7%	

Exhibit 4.57 shows the number of facilities that reported dibenzofuran within various quantity ranges. Of the 12 facilities that reported dibenzofuran in 2003, two facilities accounted for 84 percent of the total quantity of this chemical.

Exhibit 4.57. Distribution of Facilities that Reported Quantities for Dibenzofuran (2003)

Dibenzofuran (75,605 pounds)		
Quantity Reported	**Number of Facilities Reporting this quantity**	**Percent of Total Quantity for this Priority Chemical**
up to 10 pounds	1	less than 0.1%
between 11 - 100 pounds	0	0.0%
between 101 -1,000 pounds	5	2.1%
between 1,001 - 10,000 pounds	4	13.9%
between 10,001 - 100,000 pounds	2	84.0%
between 100,001 - 1 million pounds	0	0.0%
> 1 million pounds	0	0.0%

EPA Region Trends- Dibenzofuran. Exhibit 4.58 shows the quantity (pounds) of dibenzofuran in the 4 EPA Regions where facilities reported this chemical between 1999 and 2003. Dibenzofuran was reported in 1999-2000 by facilities in only 4 EPA Regions, and only 3 Regions in 2003 (Exhibit 4.59). In 2003, almost 78 percent of the dibenzofuran was reported by facilities in Regions 5. However, in Region 5, the quantity of this chemical has decreased significantly – not only compared to the 1999 quantity but even more so, the 2002 quantity. The decommissioning of a facility, located in Ohio, is believed to be the reason for the significant increase of dibenzofuran for this industry sector in 2002. Facilities in Region 3 reported over 15,000 pounds of the dibenzofuran in 2003, accounting for about 20 percent of the total quantity. This quantity represented a significant increase from quantities of dibenzofuran reported in previous years 1999 – 2002.

Exhibit 4.58. Quantity of Dibenzofuran Reported by EPA Regions (1999-2003)

EPA Region	1999	2000	2001	2002	2003	Percent Change in Quantity (1999-2003)	Percent Of the Total Priority Chemical quantity (2003)
3	2,346	3,226	3,600	5,570	15,011	539.9%	19.9%
4	2,125	2,978	377	69	1,889	-11.1%	2.5%
5	114,355	85,121	62,743	283,273	58,705	-48.7%	77.6%
10	0	1,477	0	0	0	NA	0.0%
Total	118,826	92,802	66,720	288,912	75,605	-36.4%	100.0%

Exhibit 4.59. Distribution of Facilities Reporting Dibenzofuran in 2003 & Quantity of Dibenzofuran Reported in 2003 by Region

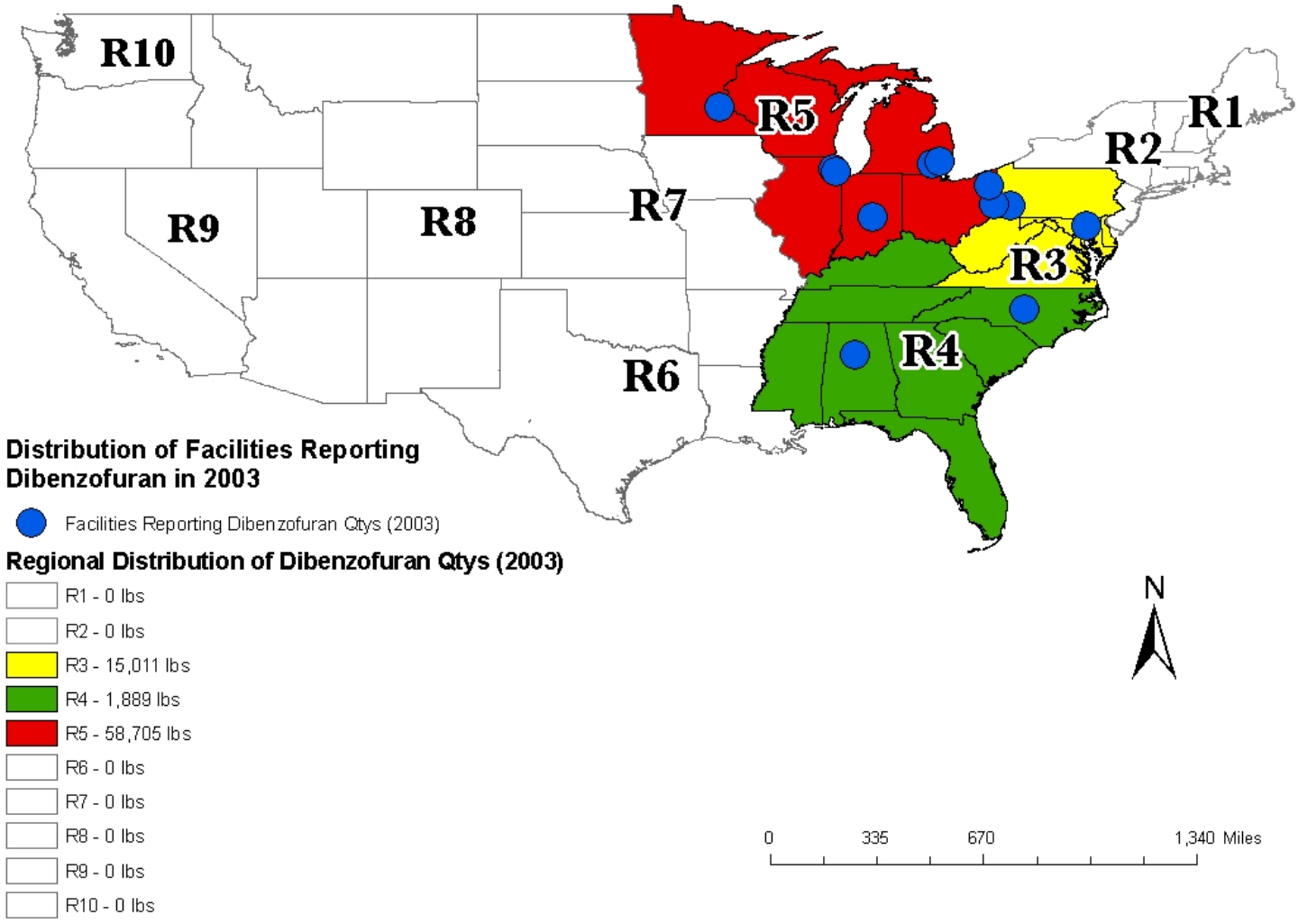


Exhibit 4.60 shows how dibenzofuran was managed by facilities within each of the 3 EPA Regions that reported this chemical in 2003. Almost 98 percent of the PC quantity of

dibenzofuran in Region 5 was sent to offsite land disposal. Facilities in Region 4 used energy recovery for about 50 percent of their quantity of dibenzofuran. Region 3 facilities used both disposal and treatment. A notable quantity of dibenzofuran was recycled by Region 5 facilities.

Exhibit 4. 60. Management Methods for Dibenzofuran, By EPA Region (2003)

EPA Region	Disposal		Energy Recovery		Treatment		Recycling	
	Onsite Disposal	Offsite Disposal	Onsite Energy Recovery	Offsite Energy Recovery	Onsite Treatment	Offsite Treatment	Onsite Recycling	Offsite Recycling
3	0	7,828	0	200	2,400	4,583	79	0
4	0	170	0	1,000	0	719	0	0
5	718	57,388	0	140	206	253	24,675	0

State Trends- Dibenzofuran. Although facilities in 10 states reported a PC quantity of dibenzofuran in 2003, facilities in 5 of these states accounted for over 99 percent of the total PC quantity of dibenzofuran. Exhibit 4.61 shows the quantity of dibenzofuran that was reported by facilities in these 5 states in 1999-2003. One facility, in Michigan (Exhibit 4.62), which only began reporting dibenzofuran in 2003, accounted for almost 69 percent of the total quantity of this chemical in 2003. One facility in West Virginia had over a 400 percent increase in 2003, compared to 1999, with most of the increase occurring between 2002 and 2003. In Illinois, the quantity of dibenzofuran has decreased by over 36 percent (Exhibit 4.62).

Exhibit 4. 61. State-Level Information for Dibenzofuran (1999-2003)

State	1999	2000	2001	2002	2003	Change in Quantity (1999-2003)	Percent Change in Quantity (1999-2003)	Percent of Total Quantity of this Priority Chemical (2003)
Michigan	0	0	0	1,248	52,202	52,202	NA	69.0%
West Virginia	2,302	1,300	2,000	3,400	12,022	9,720	422.2%	15.9%
Illinois	9,608	9,967	392	6,429	6,113	-3,495	-36.4%	8.1%
Pennsylvania	44	1,926	1,600	2,170	2,706	2,662	6050.0%	3.6%
Alabama	1,720	2,945	266	19	1,724	4	0.2%	2.3%

Exhibit 4. 62. Trends Analysis on States with Largest Quantity Increase and Decrease (1999 – 2003): Facilities in Illinois and Michigan

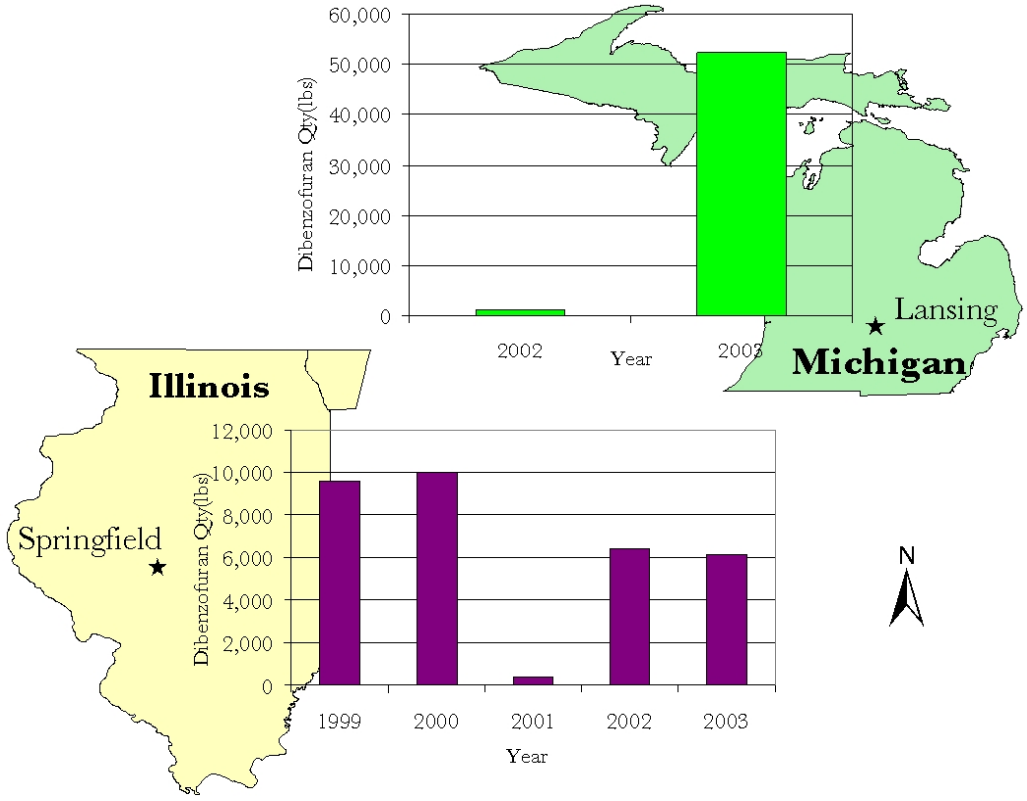
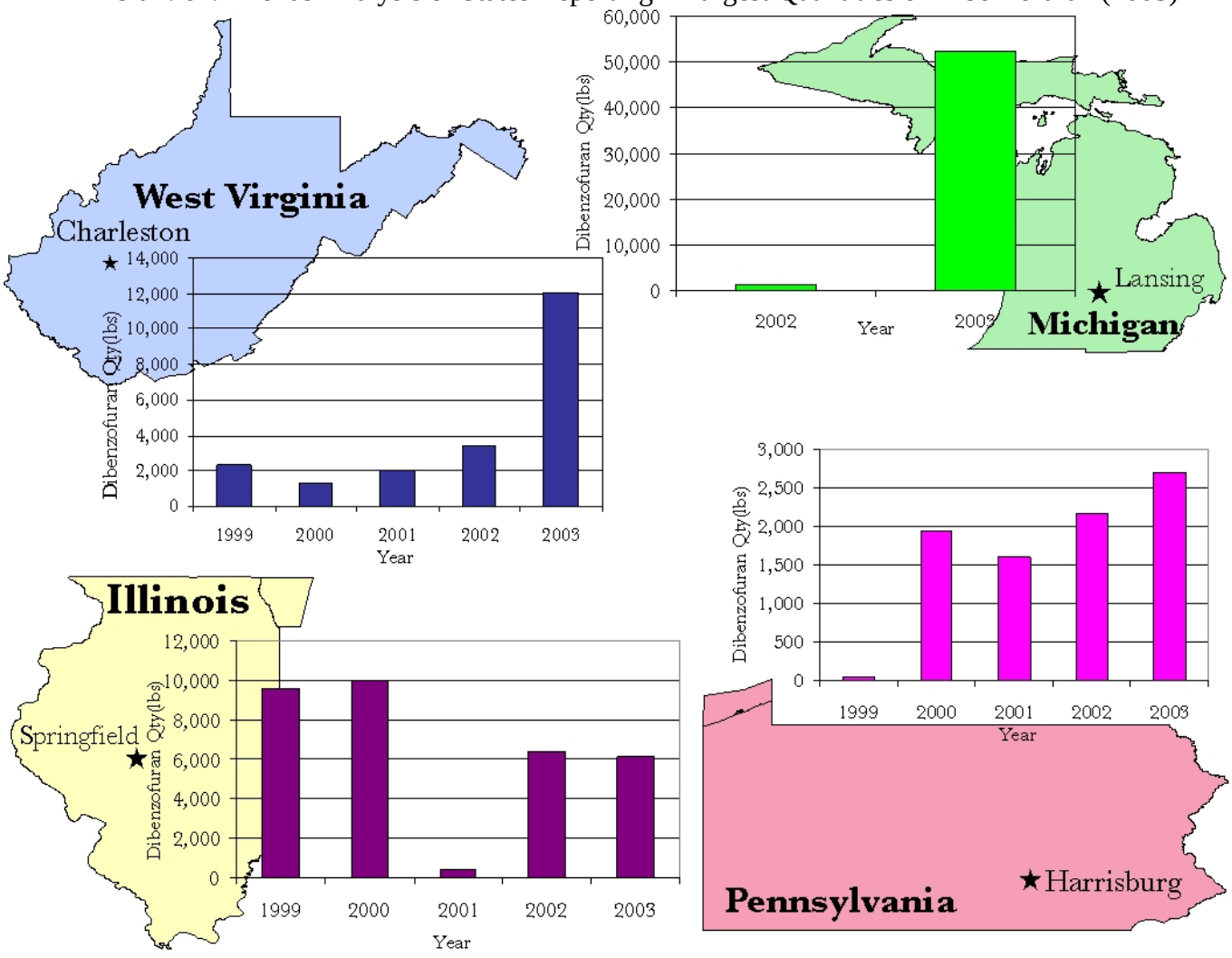


Exhibit 4. 63 shows how dibenzofuran was managed by facilities in the 5 states that accounted for over 99 percent of the total quantity of this PC in 2003. Most of the dibenzofuran reported by facilities in Michigan and Illinois was sent to offsite land disposal. Both offsite land disposal and onsite/offsite treatment were used by West Virginia facilities. Almost 78 percent of the dibenzofuran from Pennsylvania facilities was sent to offsite treatment with the remainder to offsite disposal. Alabama facilities sent their dibenzofuran to offsite energy recovery (58%) and to offsite treatment (42%). Relatively little recycling of dibenzofuran occurred in 2003.

Exhibit 4.63. Management of Dibenzofuran in States with 99 Percent of Total Quantity (2003)

State	Total Priority Chemical Quantity (2003)	Onsite Disposal	Offsite Disposal	Onsite Energy Recovery	Offsite Energy Recovery	Onsite Treatment	Offsite Treatment	Onsite Recycling	Offsite Recycling
Michigan	52,202	718	51,484	0	0	0	0	0	0
West Virginia	12,022	0	7,222	0	200	2,400	2,200	0	0
Illinois	6,113	0	5,776	0	140	197	0	897	0
Pennsylvania	2,706	0	606	0	0	0	2,100	79	0
Alabama	1,724	0	5	0	1,000	0	719	0	0

Exhibit 4. 64. Trends Analysis of States Reporting 4 Largest Quantities of Dibenzofuran (2003)



Industry Sector (SIC) Trends- Dibenzofuran. Exhibit 4.65 shows the PC quantity (pounds) of dibenzofuran for the three industry sectors (SIC codes) where facilities reported over 99 percent of this chemical in 2003. Facilities in SIC 2865 (Cyclic crudes and intermediates) reported the highest quantities, accounting for almost 93 percent of the total PC quantity of dibenzofuran reported in 2003. The decommissioning of a SIC 2865 facility, located in Ohio, is believed to be reason for the significant increase of dibenzofuran for this industry sector in 2002. In 2003, facilities in this industry sector had a decrease of over 40 percent, compared to the 1999 quantity. Compared to the quantities reported in 1999, there was a significant increase (+474%) in the quantity of dibenzofuran reported in 2003 by facilities in SIC 3312 (Blast Furnaces and steel mills). Also, facilities in SIC 3272 (Concrete products, nec) only began reporting dibenzofuran in 2002.

Exhibit 4. 65. Industry Sector-Level Information for Dibenzofuran (1999-2003)

Primary SIC Code	SIC Description	Number of Facilities for this SIC Code (2003)	1999	2000	2001	2002	2003	Change in Quantity (1999-2003)	Percent of Total Quantity of this Priority Chemical (2003)
2865	Cyclic crudes and intermediates	4	117,927	90,878	65,082	286,288	70,243	-40.4%	92.9%
3312	Blast furnaces and steel mills	2	494	158	32	212	2,834	473.7%	3.7%
3272	Concrete products, nec	3	0	0	0	2,348	2,101	NA	2.8%

Exhibit 4.66 shows how dibenzofuran was managed by the 9 facilities in the 3 industry sectors that accounted for over 99 percent of the total quantity of this PC in 2003. Most of the dibenzofuran was land disposed, primarily offsite, particularly within SIC 2865 (Cyclic crudes and intermediates). The majority of the dibenzofuran reported by facilities in SIC 3312 (Blast Furnaces and steel mills) was sent to offsite treatment. Land Disposal (onsite and offsite) also was the primary method for managing dibenzofuran within SIC 3272 – Concrete products, nec. Very little recycling of dibenzofuran was reported by facilities in these industry sectors in 2003.

Exhibit 4. 66. Management of Dibenzofuran in Industry Sectors (SIC Codes) with 99 Percent of Total Quantity (2003)

Primary SIC Code	SIC Description	Total Priority Chemical Quantity	Onsite Disposal	Offsite Disposal	Onsite Energy Recovery	Offsite Energy Recovery	Onsite Treatment	Offsite Treatment	Onsite Recycling	Offsite Recycling
2865	Cyclic crudes and intermediates	70,243	0	63,387	0	1,340	2,597	2,919	897	0
3312	Blast furnaces and steel mills	2,834	0	734	0	0	0	2,100	79	0
3272	Concrete products, nec	2,101	718	1,100	0	0	0	283	0	0

Recycling. Exhibit 4.67 provides some indication of the extent to which facilities in certain industry sectors recycled at least 100 pounds of dibenzofuran in 1999-2003, rather than manage it as a waste. For those year(s), the facility did not report a PC quantity, i.e., a quantity managed via land disposal, energy recovery, or treatment.

Exhibit 4. 67. Facilities reporting Recycling but not a PC quantity (1999-2003)

			1999		2000		2001		2002		2003	
Number of Facilities	EPA Region	State	Onsite Recycle	Offsite Recycle	Onsite Recycle	Offsite Recycle	Onsite Recycle	Offsite Recycle	Onsite Recycle	Offsite Recycle	Onsite Recycle	Offsite Recycle
SIC 2491-- Wood Preserving												
1	1	Connecticut	0	0	1,205	0	1,140	0	2,092	0	1,780	0
SIC 2865--Cyclic crudes and intermediates												
1	4	Alabama	0	0	0	0	0	0	210	0	210	0
SIC 3312-- Blast Furnaces and steel mills												
1	3	Pennsylvania	36,000	0	76,000	0	88,000	0	15,000	0	13,477	0
2	4	Alabama	553	0	5,812	0	5,172	0	5,793	0	10,332	0
SIC 4925-- Gas production and/or distribution												
1	5	Indiana	33,593	0	0	0	0	0	0	0	0	0